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AUTHOR Bushnell, Emily W.
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ABSTRACT

In order to investigate the development of word-formation abilities, 3-, 5-, and 7-year-olds were asked to act out with toys, judge, and make up sentences containing instances of class extension. Some sample sentences are "Can you upside-down the clown?" and "Broom the spoon." Children dealt with such sentences in much the same way they deal with normal sentences. All ages were able to understand many of the sentences, 3-year-olds frequently made word-order errors in the comprehension task, and 5-year-olds often confused syntax with semantics in the judgment task. Particular lexical items and analogy types were difficult for all ages. The results suggest that word-formation abilities keep pace with syntactic development and are generative. (Author/CFM)

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Children's Dealing with Accidental Gaps in the Lexicon

Emily W. Bushnell
Institute of Child Development
University of Minnesota

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This paper was presented at the Biennial Meeting of the Society for Research in Child Development held in New Orleans, March 17-20, 1977. The research discussed was supported by a University of Minnesota Graduate School grant (458-0350-4909-02) to Dr. Michael Maratsos and a USPHS Traineeship (5-T01-MH06668-18) to the author. I thank Dr. Maratsos for his help in all phases of the study and Lori Cranston for her help in running the subjects.

It is accepted without argument that linguistic competence consists of a finite set of generative rules. Only such generative rules can account for the comprehension and production of an infinite number of sentences, most of them novel, by any native speaker. Observations of overregularizations and of consistent errors in the construction of negatives and questions in spontaneous speech samples indicate that even the incomplete syntactic knowledge of young children consists of abstract, productive rules (Brown, 1973; Brown, Cazden, & Bellugi, 1969; Cazden, 1968; Klima & Bellugi-Klima, 1966). Experimental procedures using nonsense words and acting out paradigms further establish this point (Berko, 1958; Bever, 1970; Chomsky, 1969; de Villiers & de Villiers, 1973; Maratsos, 1974).

A type of linguistic rule studied less frequently than those firmly grounded in transformational grammar and just alluded to is that of word formation. As McCawley (1970) and others have noted, languages have "accidental linguistic gaps," which can be filled in according to systematic rules which generate words legitimately in the lexicon; that is, by analogy with words commonly in use. For instance, some nouns which refer to containers may also be used as verbs meaning to place the object noun phrase into that sort of container; we bottle Coca-cola and we house guests. The novel verb phrases suitcase the clothes and barn the horses are easily constructed and comprehended by analogy, though neither suitcase nor barn is listed as a verb in Webster's. There is some evidence, both observational (Bowerman, 1974; Chukovsky, 1968) and experimental (Bogoyavlenskiy, 1973; Brown, 1957), that young children are adept at such word formation and hence possess generative lexical rules, in addition to generative syntactic rules. Melissa Bowerman's daughter, for example, produced a number of sentences involving errors in verb usage, such as "Down your little knee," and "I'm just gonna fall this on her (Bowerman 1974)." Such errors were apparently made by analogy with words such as open

and break. Both Roger Brown (1957) and the Russian Bogoyavlenskiy, (1973) have empirically demonstrated that young children can comprehend novel words if provided clues in the form of meaningful morphemes such as -ing or the diminutive suffix.

On the other hand, not all adults are equally facile with the word formation process. The Gleitmans (Gleitman & Gleitman, 1970) found that their least educated group of adults was unable to employ a common word formation procedure, class extension, in order to correctly paraphrase novel compound nouns. For some adults, then, lexical linguistic competence may be more like a memorized vocabulary list than a set of systematic rules specifying the types of possible lexical items. Michael Maratsos and I wondered about this word formation process in children--whether it is indeed generative, whether various types of analogies are differentially difficult to make, whether children even view such constructions as deviant or novel. Hence, we investigated the class extension abilities of 3, 5, and 7 year olds.

Sixty-six children from the University Day Care Center, the Institute of Child Development's lab nursery school, and art classes held at the nursery school served as subjects. The children were asked to act out with toys 26 sentences, some of which used verbs as nouns, such as Make the lady do a loud tell; some of which used nouns as verbs, such as Pillow me; and some of which used adjectives as verbs, such as Can you upsidedown the clown? Nine of the sentences using nouns as verbs were designated reversible sentences, in which one noun served as the verb and another noun as the verb's object. Half the children in each age group were asked to act out one order--for instance, to Broom the spoon--and the other half were asked to act out the alternative order--to Spoon the broom. Six of the 22 children in each age group were control subjects. For the reversible sentences, the control subjects were asked simply to "do something with these two toys," to determine whether one or

the other of the alternative actions was more natural. For all other sentences, the control subjects were asked to perform the actions with normal English sentences, to see whether the words were understood when used properly. We also had 4 adults serve as subjects, in order to check our intuitions about correct and incorrect responses.

Under the guise of helping a puppet learn to talk, the children were also asked to judge 5 class extension sentences and 5 proper sentences as sounding either "silly" or "good," "right" or "wrong." And finally they were asked to make up silly sentences describing 6 actions the experimenter demonstrated. For this production task, the children were coached and prompted in a variety of ways.

Each child's response for each sentence was scored as correct or incorrect according to whether the appropriate action was performed. Within each subject group and word-class type, the scores of the experimental subjects were compared to the scores of the controls by one-tailed t-tests. For the non-reversible sentences, in no case did the experimental subjects score significantly worse than the controls. The class extension sentences were understood just as well as the proper English sentences. This result does not necessarily mean that the children understood the linguistic structure of all of our sentences, however. In a few cases, neither the experimental group nor the control group responded correctly. On items using verbs as nouns, for instance, the subjects were required to perform two different actions--such as a heavy carry and then a light carry, or a messy eat and then a polite eat. The three year olds, both the experimental subjects and the control subjects, often failed to make the two actions distinct, indicating that perhaps they didn't understand the opposing adjectives used. The scores of the experimental subjects and the controls were equal, but equally poor. In other instances, both the experimental and control children performed correctly, but their responses

may have been based on nonlinguistic knowledge--that is, perhaps there was no other reasonable action to carry out, whether or not the verbal command was comprehended. Given a bare-foot doll and her boots, what else would one do but put the boots on, or as we phrased it, boot her? Responses based on such cognitive knowledge were controlled for only with our reversible sentences, and so they really form the critical data of our experiment.

For the reversible sentences, the comparison between the experimental scores and the control scores was significant at the .05 level for every group. The class extension sentences apparently did provide more meaning that the simple request to do something with the toys. In many cases, the children's remarks and behavior clearly illustrated that they had understood the experimental sentences. One five year old, when asked to basket a truck, put th large truck in the large basket, then picked up the small basket and said, "You can't basket anything in here--'cept only a penny."

For the reversible sentence results, though, there are also some qualifications--our subjects did not perform perfectly. Although more often correct than their controls on the reversible sentences, the 3 year olds were rarely correct on more than half of them, with the most common error being to act out the reversed order sentence. The class extension sentence served to reduce to two the many possible responses to the control request, but then these two remaining alternatives were selected from randomly. This result is compatible with the reported finding that young speakers often confuse subject and object in comprehension tasks (Chapman & Miller, 1975; de Villiers & de Villiers, 1973).

With the reversible sentences, we were able to contrast the subjects' performances on two types of word-formation analogies--the container or location type mentioned earlier and a tool type modeled after legitimate words such as hammer, pin, and saw. All ages understood the tool type of class extension sentence more often than the location type; this comparison was significant

for the 5 year olds and the 7 year olds. I suspect that the older children recognized the deviance of sentences such as Basket a truck and rather than extending the word class of basket, they assumed the experimenter had left out some words and really meant Put a basket in a truck. Location type sentences may also be harder because the object that must be picked up is the second noun mentioned, whereas in tool type sentences the linguistic order and the behavioral order are compatible--to spoon a broom, one picks up and uses the first noun mentioned, the spoon.

With the exceptions already discussed, then, our subjects were able to deal with the novel class extension sentences quite easily. In addition, the 5 year olds and 7 year olds were able to produce the appropriate class extension phrase for 2 and 3 of the 6 actions the experimenter demonstrated. Although the 3 year olds were unable to address themselves to this production task, they frequently used the class extension phrases describing their own responses in the comprehension task, even adding the appropriate grammatical morphemes such as -ed or -ing. For instance, asked to dirt the boy, one 3 year old rolled the doll in the dirt and then said, "There. I dirt the boy. He's dirty." In fact, the 3 year olds generally behaved as if they were assimilating new and legitimate words or uses of words--they gave no indications of recognizing the deviance or novelty of our stimuli. They were not able to carry out the judgment task at all, and never laughed at or asked about the sentences during the comprehension task.

The 5 year olds were able todo the judgment task, but weren't especially good at it. They often confused syntax and semantics in making their judgments, deeming wrong the sentence, I drew on the trashcan with the lipstick and right the sentence The boy did a nice green draw. They did occasionally ask what an experimental sentence meant, suggesting that sometimes deviance was recognized. Of all our subjects, the 5 year olds seemed to grasp the game-

like nature of the task and enjoy it the most. Remarks using the class extension phrases lightly were common. One boy, on nearly every item, laughed and said things like, "There, that's how you monster the boy."

The 7 year olds' judgments were nearly always correct, and they quite frequently asked about a sentence or said they didn't know what it meant. In spite of this clear recognition of our sentences as deviant, when instructed to guess what they meant, the 7 year olds were quite accurate.

The best general conclusion from our study is that children deal with class extension sentences in much the same way they deal with other sentences. Three year olds make word order errors in comprehension tasks and 5 year olds confuse syntax and semantics in judgment tasks, whether or not the sentences contain instances of class extension. Apart from these characteristic mistakes, children are rather good at filling in lexical gaps. Children's word formation abilities seem to keep pace with syntactic development and seem to be generative, at least at the level of difficulty we tapped.

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